UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/637,716	08/08/2003	Norbert Kerner	56/411	3522

757 7590 05/05/2005

BRINKS HOFER GILSON & LIONE
P.O. BOX 10395
CHICAGO, IL 60610

EXAMINER	
MILLER, PATRICK L	
ART UNIT	**PAPER NUMBER**
2837	

DATE MAILED: 05/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/637,716	KERNER ET AL.	
	Examiner	Art Unit	
	Patrick Miller	2837	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 February 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *5,6,14,15 and 17-20* is/are allowed.

6)☒ Claim(s) *1-4,7,9-13,16,29 and 30* is/are rejected.

7)☒ Claim(s) *8,21-28 and 31-34* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12052003*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claim 29 is rejected under 35 U.S.C. 102(b) as being anticipated by Fujii et al. (5,175,483).

- With respect to claim 29, Fujii et al. disclose a method for determining a control parameter of an electric drive comprising: determining a mass moment of inertia of the electric motor driver by determining a compensation current which compensates losses occurring at a constant motor speed so that the motor speed remains constant (col. 2, lines 11-14; input into Equation 1); determining an acceleration current which generates a defined acceleration of the motor when the losses are compensated (col. 2, lines 15-19); calculating the mass moment of inertia of the electric motor drive system based on the determined acceleration current (Equation 1 is total moment of inertia for system); and determining control parameters by performing a calculation based on the mass moment of inertia of the electric motor drive system and a mass moment of inertia of the drive motor (col. 2, ll. 41-43; changing rates of speed based on the calculated inertia).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. as applied to claim 29 above, and further in view of Rehm et al. (6,144,181).
   - Fujii et al. do not disclose the limitations of claim 30.
   - Rehm et al. teach that the load inertia can be calculated by subtracting the motor inertia from the total inertia. Rehm et al. also disclose that the motor inertia is typically given for a particular motor (col. 9, lines 27-37). The motivation to calculate the load inertia as described is to provide the advantage of compensating resonances caused by specific load inertias (abstract).
   - Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to use the total system inertia as calculated by Fujii et al. and the given motor inertia to calculate the load inertia, thereby providing the advantage of compensating resonances caused by specific load inertias, as taught by Rehm et al.
3. Claims 1-3, 9, 10, 11, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. (5,175,483) in view of Barkus et al. (6,368,265).
   - Fujii et al. disclose a method for determining a mass moment of inertia of an electric motor drive system of a machine, comprising a drive motor and additional drive elements (Fig. 1, #6 and other components), the method comprising: determining a compensation

current that compensates losses occurring at a constant motor speed (col. 2, lines 11-14; input into Equation 1); determining an acceleration current that generates a defined acceleration of the drive motor when losses are compensated (col. 2, lines 15-19); and calculating the mass moment of inertia based on the determined acceleration current and a constant (Equation 1 is total moment of inertia for system and K1 is a proportionality constant, which from Equation 8 is interpreted as being a motor torque constant).

- Fujii et al. disclose calculating the mass moment of inertia based on a constant and the determined acceleration, but do not disclose *calculating* the motor torque constant.
- Barkus et al. disclose calculating the motor torque constant (Fig. 1, #115; see also col. 4, ll. 8-24). Additionally, the motor torque constant is determined based on the average voltage generated by the motor, while the rotor is rotating. Calculating the motor torque constant as described is advantageous because this provides a more accurate constant value based on the actual type and performance of the motor.
- Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to calculate the motor torque constant of Fujii et al., as described by Barkus et al., thereby providing the advantage of a more accurate constant value based on the actual type and performance of the motor, as taught by Barkus et al.
- With respect to claims 2 and 3, Fujii et al. disclose the compensation current is for driving the motor at a constant speed for at least one motor speed or two different motor speeds (Fig. 9, three constant speed areas).
- With respect to claim 9, Fujii et al. disclose determining acceleration current comprises operating the drive motor at two different accelerations (Fig. 9, col. 2, lines 34-49).

- With respect to claim 10, Fujii et al. disclose the two different accelerations have different signs, i.e., can calculate for acceleration and deceleration (col. 2, lines 45-49).
- With respect to claims 11 and 12, Fujii et al. disclose the two accelerations remaining constant for a presettable length of time (Fig. 9; col. 8, ll. 25-62).
- With respect to claim 13, Fujii et al. disclose determining acceleration by a difference between a total torque current and the determined compensation current (col. 2, ll. 11-19; current to torque and difference taken in Equation 1).

4. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. and Barkus et al. as applied to claim 1 above, and further in view Igarashi et al. (EP 1088674 A1).

- Fujii et al. and Barkus et al. do not disclose controlling a number of revolutions of the drive motor.
- Igarashi et al. disclose controlling the number of revolutions of the driver motor for a printer ([0054]-[0056]). Igarashi et al. stops the current supplied to the motor to stop the driven load at a specific location, thus controlling the number of revolutions of the motor. This provides the advantage of allowing the system to know the position of the load and/or rotor.
- Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to implement into the system of Fujii et al. and Barkus et al. a system which controls the number of revolutions of the motor because the Igarashi et al. system is used with a printer and the Fujii et al. system can control a printer, thereby providing for the system of Fujii et al. and Barkus et al. the advantage of identifying the position of the load and/or rotor, as taught by Igarashi et al.

5. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. and Barkus et al. as applied to claim 1 above, and further in view of Rehm et al. (6,144,181).

- Fujii et al. and Barkus et al. do not disclose determining a mass moment of inertia of a load by subtracting the mass moment of inertia of the motor from the total mass moment of inertia of the drive system.
- Rehm et al teach that the load inertia can be calculated by subtracting the motor inertia from the total inertia. Rehm et al also disclose that the motor inertia is typically given for a particular motor (col. 9, lines 27-37). The motivation to calculate the load inertia as described is to provide the advantage of compensating resonances caused by specific load inertias (abstract).
- Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to use the total system inertia as calculated by Fujii et al. and Barkus et al. and the given motor inertia to calculate the load inertia, thereby providing the advantage of compensating resonances caused by specific load inertias, as taught by Rehm et al.

6. Claims 1-4 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Didier et al. (4,607,408) in view of Rehm et al. (6,144,181) and Barkus et al. (6,368,265).

- Didier et al. disclose a method for determining a mass moment of inertia of an electric motor drive system of a machine, comprising a drive motor and additional drive elements (Fig. 4; col. 2, lines 42-54), the method comprising: determining a compensation current that compensates losses occurring at a constant motor speed (Fig. 2, current between times, t2 and t3); determining an acceleration current that generates a defined

acceleration of the drive motor when losses are compensated (Fig. 2, since the current at t3 is the known compensation current, the current between time, t3 and t4 is the known acceleration current taking into consideration the compensation current); and calculating the mass moment of inertia based on the determined acceleration current and a torque constant (col. 6, ll. 44-56; K is interpreted to be a torque constant since the formula for T is Kt*I; additionally, dw/dt is acceleration).

- Didier et al. disclose calculating the mass moment of inertia for the load, but do not disclose calculating the mass moment of inertia for the electric drive system. Additionally, Didier et al. disclose calculating the mass moment of inertia based on a torque constant and the determined acceleration, but do not disclose *calculating* the motor torque constant.
- Barkus et al. disclose calculating the motor torque constant (Fig. 1, #115; see also col. 4, ll. 8-24). Additionally, the motor torque constant is determined based on the average voltage generated by the motor, while the rotor is rotating. Calculating the motor torque constant as described is advantageous because this provides a more accurate constant value based on the actual type and performance of the motor.
- Rehm et al. teach that the total mass moment of inertia can be calculated by subtracting the motor inertia from the load inertia. Rehm et al. also disclose that the motor inertia is typically given for a particular motor (col. 9, lines 27-37). The motivation to calculate the total system inertia as described above is to supply the necessary current to the motor based on the system inertia requirements. This provides the advantage of improving system efficiency and increasing the motor's life.

- Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to calculate the mass moment of inertia of the electric motor system using the given motor inertia, and the load inertia calculated as in Didier et al., thereby providing the advantage of improving system efficiency and increasing the motor's life, as taught by Rehm et al. Additionally, it would have been obvious to one having ordinary skill in the art at the time of the invention to calculate the motor torque constant of Didier et al., as described by Barkus et al., thereby providing the advantage of a more accurate constant value based on the actual type and performance of the motor, as taught by Barkus et al.
- With respect to claim 2, Didier et al. disclose determining compensation current comprises determining the current required to drive the motor at a constant speed (Figs. 1 and 2, current between t2 and t3 drives at a constant speed, V23).
- With respect to claim 3, Didier et al. disclose the motor speed comprises at least two different speeds (Fig. 1, motor has two constant speeds, between t2 and t3 and t4 and t5, respectively).
- With respect to claim 4, Didier et al. disclose the speed remains constant for a presettable length of time (Fig. 1, set time is from t2 to t3; set based on the speed requirements; col. 4, lines 39-57).
- With respect to claim 13, Didier et al. disclose determining acceleration by a difference between a total torque current and the determined compensation current (col. 5, l. 50; difference in actual current and compensation current Io).

Allowable Subject Matter

7. Claims 5, 6, 14, 15, and 17-20 are allowed.

8. The following is an examiner's statement of reasons for allowance:

   - With respect to claims 5 and 6, the Prior Art does not disclose a method for determining a mass moment of inertia of an electric motor system with the limitations disclosed and where the at least one motor speed comprises two constant motor speeds, and the two constant motor speeds have the same value, but opposite signs.
   - With respect to claims 14 and 15, the Prior Art does not disclose calculating the mass moment of inertia of the electric motor drive system based on the determined acceleration current and where the calculation involves equating two formulations of the defined acceleration of the drive motor.
   - With respect to claims 17-20, the Prior Art does not disclose calculating the mass moment of inertia of the electric motor drive system based on the determined acceleration current and where the calculating comprises determining a mass moment of inertia of a load of the drive system from a difference between a total mass moment of inertia of the drive system and a mass moment of inertia of the drive motor, and calculating a ratio of the mass moment of inertia of the drive motor to the mass moment of inertia of the load.

9. Claims 8, 21-28, and 31-34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

- With respect to claim 8, the Prior Art does not disclose the limitations of claims 1 and 7 and where the determined compensation current is formed by the use of feed-forward current of a revolution speed controller.
- With respect to claims 21 and 22, the Prior Art does not disclose the at least two motor speeds having the same value but opposite signs.
- With respect to claims 23 and 24, the Prior Art does not disclose the calculating, as disclosed in claim 1, comprising equating two formulations of an acceleration of the drive motor.
- With respect to claims 25-28 and 31-34, the Prior Art does not disclose the calculating step, as disclosed in claims 1 and 16 and 29 and 30, respectively, further comprising calculating a ratio of the mass moment of inertia of the drive motor to the mass moment of inertia of the load.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick Miller whose telephone number is 571-272-2070. The examiner can normally be reached on M-F, 8:30-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Martin can be reached on 571-272-2800 ext 41. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9318.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-3431.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Patrick Miller
Examiner
Art Unit 2837

pm
May 1, 2005

DAVID MARTIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800